Chapter 7
Air Defense

This chapter provides an overview of selected air defense systems either in use or readily available to an OPFOR. The selection of weapons is not intended to be all-inclusive, but rather a representative sampling of weapons and equipment supporting various OPFOR military capabilities.

This chapter is divided into three categories—***towed AA guns***, ***self-propelled AA guns/combination guns*** and ***surface-to-air missiles (SAMs)***. ***Towed AA guns*** covers, in order, the KS-19M2 100-mm gun, S-60 57-mm gun and the ZU-23 23-mm gun. The next category, ***self-propelled AA guns/combination guns***, contains the ZSU-23-4 23-mm gun and the 2S6 30-mm gun/missile system. The final category of ***surface-to-air missiles (SAMs)*** consists of the SA-7b, SA-8b, SA-14, SA-15b and the SA-18.

Tactical air defense is used to protect ground force units and other potential targets from attack by enemy fixed-wing aircraft and armed helicopters. Due to increases in performance and the sheer number of air defense systems, specifically manportable systems, the selected systems represent some of the most formidable threats to aircraft of all types.

Some trends in air defense development will become more widespread in the near future. These include the production of authorized and unauthorized copies of existing systems and the development of hybrid systems. The sensor package may consist of one or more radars, direct view optics, and electro-optics systems. The sensor package is the single most important aspect of air defense systems since these devices perform the surveillance and tracking functions. As the data classification permits, all attempts have been made to provide the user with as much information as possible in these areas. Radar systems have traditionally been the most popular sensor for air-defense systems, however, with the latest generation weapons they are usually supplemented with a variety of optic or electro-optic sensors such as; TV cameras, night vision sights, and laser rangefinders. As the trends become more defined and more information becomes available, updates to the systems will be produced.

Questions and comments on data listed in this chapter should be addressed to:

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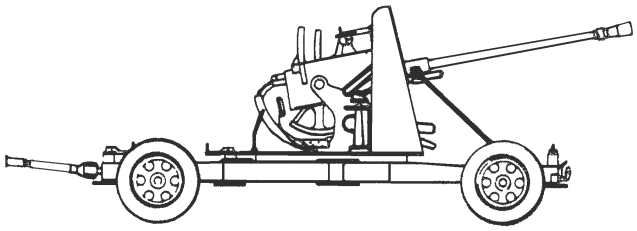
Russian 37-mm Towed AA Gun M-1939



Weapons & Ammunition Types	Typical Combat Load
1 x 37-mm AA gun	**200**
HE	
HE-FRAG-T	
AP	
AP-T	
HVAP	
HVAP-T	
HEI-T	

SYSTEM
Alternative Designation: None
Date of Introduction: 1939
Proliferation: At least 50 countries

Description:
Crew: 8
Carriage: Four-wheels
Combat Weight (kg): 2,050
Length Overall (m): 6.04
Length of Barrel (m): 2.73
Height Overall (m): 2.11
Width Overall (m): 1.95
Prime Movers: Utility, small, medium trucks

Automotive Performance:
Max. Towed Speed (km/h): 60
Cross Country (km/h): 25
Fording Depth (m): 0.7
Emplacement Time (sec): 30
Displacement Time (sec): 30

ARMAMENT
Gun
Caliber, Type: 37-mm rifled
Number of Barrels: 1
Breech Mechanism: Rising Block
Rate of Fire (rd/min):
- Cyclic: 180
- Practical: 80

Clip Capacity (rds): 5
Feed: Gravity
Loader Type: Manual
Reload Time (sec): 2
Traverse (°): 360
Traverse Rate (°/sec): 61
Elevation (°) (-/+): -5/+85
Elevation Rate: (°/sec): 22

FIRE CONTROL

Sights w/magnification:
AZP-37 Optical sight

AMMUNITION
Type: HE, HE-FRAG-T, AP, AP-T, HVAP, HVAP-T, HEI-T
Range (m):
- Max. Range (ground): 9,600
- Max. Eff Range (slant): 3,000
- Max. Altitude: 6,700

Armor Penetration (mm): 55 @ 500 m
Projectile Weight (kg):
- HE: 0.74
- AP: 0.77
- HE-FRAG-T: 0.73
- HVAP: 0.62
- HEI-T: INA

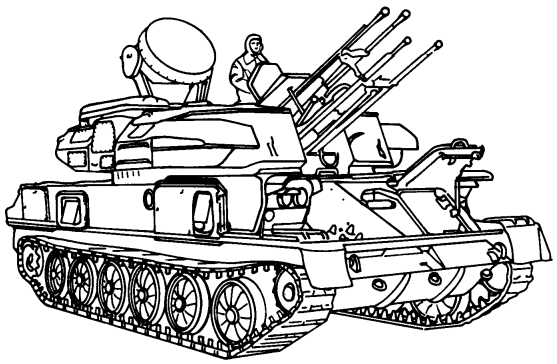
Muzzle Velocity (m/s):
- HE: 880
- AP: 880
- HVAP: 960
- HEI-T: INA
- HE-FRAG-T: 880

Self-Destruct (sec): 8 to 12
Self-Destruct Range (m): 3,700 to 4,700

VARIANTS
Type 55: Chinese designation
Type 65: Chinese twin barrel
Twin barrel exports

NOTES
The M-1939 is a towed 37-mm antiaircraft gun mounted on a four-wheeled carriage. During traveling, it can be fired from wheels at halts or fired while traveling. Normal emplacement however, requires the wheels to be removed and a jack placed under each axle for support prior to firing. The M-1939 is manually loaded with clips of five rounds each. The rounds are gravity fed into the vertically opening sliding breech with the empty cartridges automatically extracted. The M-1939 is a derivative of the BOFORS L60. Because it lacks a radar and powered gun laying motors, the M-1939 is considered to be effective only during daylight and in fair weather.

Russian 23-mm SP AA Gun ZSU-23-4



Weapons & Ammunition Types	Typical Combat Load
4x 23-mm AA guns	**2,000**
HE-I HEI-T API-T	

SYSTEM
Alternative Designation: Shilka
Date of Introduction: 1965
Proliferation: At least 28 countries

Description:
Crew: 4
Combat Weight (mt): 20.5
Chassis: GM-575 Tracked, six road wheels, no track support rollers
Length (m): 6.5
Height (m):
Radar up: 3.75
Radar down: 2.60
Width (m): 3.1

Automotive Performance:
Engine Type: V6R-1 diesel
Cruising Range (km): 450
Speed (km/h):
Max. Road: 50

Radio: R-123

Protection:
NBC Protection System: Yes

ARMAMENT
Gun:
Caliber, Type, Name: 23-mm liquid-cooled AA 2A7/2A7M
Rate of Fire(rd/min):
Practical: INA
Cyclic: 850-1,000
Reload Time (min): 20
Elevation (^{o}): -4° to +85°
Fire on Move: Yes
Reaction Time (sec): 12-18

FIRE CONTROL
Sights w/magnification:
Day and night vision devices:
Driver periscope: BMO-190
Driver IR periscope: INA
Commander periscope: TPKU-2
Commander IR periscope: TKH-ITC
IFF: INA

Radar: 1RL33M1
Name: GUN DISH
Function: Search and Tracking
Detection Range (km): 20
Tracking Range (km): 10
Frequency: 14.8 to 15.6 GHz
Frequency Band: J

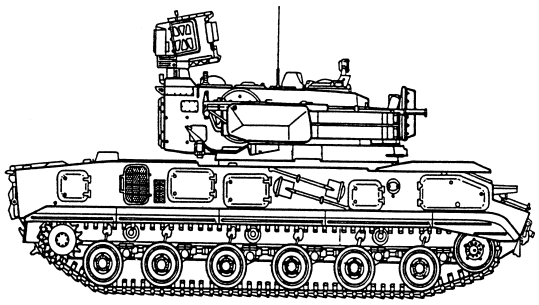
Optical-mechanical computing sight: Part of fire-control subsystem designated as RPK-2

VARIANTS
(see NOTES)

MAIN ARMAMENT AMMUNITION
Types: HE-I, HEI-T, API-T
Range (m):
Max. Effective Range: 2,500
Min. Range: INA
Altitude (m):
Max. Altitude: 5,100
3,500 if self-destruct fuze is included
Min. Altitude: INA
Projectile Weight (kg):
HE-I: 0.18
HEI-T: 0.19
API-T: 0.189
Muzzle velocity (m/s)**:** 950-1,000
Fuze Type:
HE-I: Point detonating, self-destruct option
HEI-T: Point detonating, self-destruct option
APT-T: Base detonating

NOTES
Ammunition is normally loaded with a ratio of three HE rounds to one AP round. ZSU 23-4 Shilka, is capable of acquiring, tracking and engaging low-flying aircraft (as well as mobile ground targets while either in place or on the move). Resupply vehicles carry an estimated additional 3,000 rounds for each of the four ZSUs in a typical battery. Recent (October 1997) information details ZSU-23-4 updates/modernization being offered by the Ukrainians that include: a new radar system replacing the GUN DISH radar, plus a sensor pod believed to include day/night camera, and a laser rangefinder; and mounted above radar/sensor pod is a layer of six fire-and-forget SAMs, believed to be Russian SA-18/GROUSE.

Russian 30-mm SP AA Gun/Missile System 2S6M



Weapons & Ammunition Types	Typical Combat Load
2 x 30-mm twin-barrel cannons	**1,904**
AP-T, APDS Frag-T HE-I APE	
SA-19/GRISON	**8**

SYSTEM
Alternative Designations: 2K22M, Tunguska-M
Date of Introduction: 1990
Proliferation: At least 2 countries

Description:
Crew: 4
Combat Weight (mt): 34
Chassis: GM-352M tracked vehicle
Chassis Length Overall (m): 7.93
Height (m):
- TAR up: 4.02
- TAR down: 3.36

Width Overall (m): 3.24

Automotive Performance:
Engine Type: V-12 turbo diesel
Cruising Range (km): 500
Speed (km/h):
- Max. Road: 65
- Max. Swim: INA

Fording Depths (m): INA

Radio: R-173

Protection:
NBC Protection System: Yes

ARMAMENT
Gun:
Caliber, Type, Name: 30-mm gun, 2A38M
Rate of Fire (rd/min): 4,800 (four gun total)
Reload Time (min): gun ammunition and missiles in about 16 min.
Elevation (°) (-/+): -10 to + 87°
Fire on Move: Yes

Missile: 9M311
Name: SA-19/GRISON
Range (m):
- Max. Range: 8,000-10,000 (see NOTES)
- Min. Range: 2,500

Altitude (m):
- Max. Altitude: 3,500
- Min. Altitude: 15

Dimensions:
- Length (m): 2.83

Weight (kg): 57 (in container)
Missile Speed (m/s): 600-900
Guidance: SACLOS
Seeker Field of View(°) : INA
Tracking Rate: INA
Warhead Type: Frag-HE
Warhead Weight (kg): 9
Fuze Type: Proximity
Self-Destruct (sec): INA
System Reaction Time (sec): 6-12
Fire on Move: No (must be at a halt to fire the missile)

FIRE CONTROL
Sights w/magnification:
Stabilized optical sight 1A29M
- Magnification: 8x
- Field of View(°): 8°

Commander's position IR day/night sight
Night sight: 1TPP1 thermal available
IFF: Yes

Radars: HOT SHOT radar system
Name: 1RL144 (TAR)
- Function: Target Acquisition
- Detection Range (km): 18-20
- Tracking Range (km): INA
- Frequency: 2-3 GHz
- Frequency Band: E

Name: 1RL144M (TTR)
- Function: Target Tracking
- Detection Range (km): 16
- Tracking Range (km): INA
- Frequency: 10-20 GHz
- Frequency Band: J

VARIANTS
(see NOTES)

MAIN ARMAMENT AMMUNITION
Type: AP-T, APDS, Frag-T, HE-I, APE
Range (m):
- Max. Range: 4,000
- Min. Range: 200

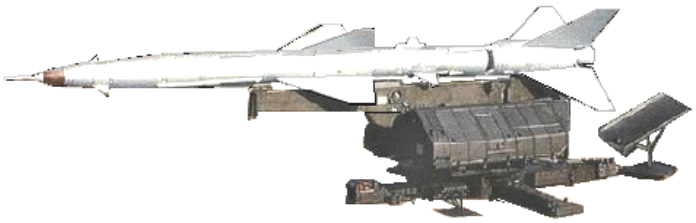
Altitude (m):
- Max. Altitude: 3,000
- Min. Altitude: 0

Projectile Weight (kg): INA

NOTES
Range out to 10 km for hovering aircraft and low flying targets. In addition to the 8 mounted ready missiles two additional missiles can be carried inside. There is a 2S6M1 variant/upgrade, which has improved missile control, range and altitude capabilities of 1.5-10 km, and 0.015-6 km respectively. However, as of November 1997 the 2S6M1 is not known to be fielded.

Main operating mode is radar mode, with day/night capability. The 1TPP1 thermal module is available for mounting on 2S6M. This sight has a range of 4,000-6,000 m.

Russian SAM System SA-2/GUIDELINE



Weapons & Ammunition Types	Typical Combat Load
Single rail ground mounted	**Six launchers per battery**

SYSTEM
Alternative Designations: V75SM, S-75 Dvina, V-75 Volkhov
Date of Introduction: 1959
Proliferation: At least 41 countries

ARMAMENT
Launcher
Description: Single-rail, ground- mounted, not mobile but transportable
Name: INA
Dimensions: INA
Weight (kg): INA
Reaction Time (sec): INA
Time Between Launches (sec): INA
Reload Time (min): 10-12
Fire on Move: No
Emplacement Time (min): < 4 hours
Displacement Time (min): < 4 hours
Normal Salvo: 3 missiles at six-second intervals

Missile: V750K
Name: INA
Range (km):
Max. Range: 35-50 Volga 55, Volga-M 67
Min. Range: 7-9
Altitude (m):
Max. Altitude: 28,000
Volga, Volga-M 30,000
Min. Altitude: 100
Dimensions:
Length (m): 10.70
Diameter (m): 0.70
Weight (kg): 2,300-2,450 at launch
Missile Speed (mach): 4.5
Propulsion:
Solid fuel booster 5 sec duration
Sustainer liquid <70 sec duration
Guidance: Command RF
Warhead Types: HE, Nuc
Bursting Radius (m): 125-135
Kill Radius (m): 65
CEP (m): 76.3
Fuze Type: Proximity or Command
Command destruction at (sec): 115
Warhead Weight (kg): 195 HE

FIRE CONTROL
Radar:
Name: FAN SONG, A-F variants
Function: Fire Control
Control Range (km): 60-120 A, B
70-145 for C, D, E
INA for F
Frequency Band: E/F for A, B G for C, D, E, INA for F
Location: Within battery formation

Radar:
Name: SPOON REST, P-12
Function: Target Acquisition, Early Warning
Detection Range (km): 275
Frequency Band:
A=A (VHF)
B=VHF below A band
Location: Outside battery formation

Radar:
Name: FLAT FACE, P-15
Function: Early warning, target acquisition
Detection Range (km): 250
Frequency Band: C
Location: At regimental HQ

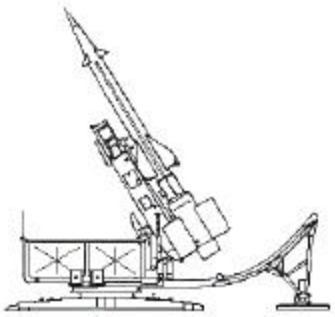
Radar:
Name: SIDE NET, PRV-11
Function: Height Finding Radar
Detection Range (km): 180
Frequency Band: E
Location: At regimental HQs in some cases

VARIANTS
SA-2a (Mod 0): FAN SONG A
SA-2b (Mod 1): FAN SONG B, longer missile
SA-2c (Mod 2): FAN SONG C, longer range, lower altitude engagement
SA-2d (Mod 3): FAN SONG E, EW enhanced
SA-2e (Mod 4): FAN SONG E nuc variant
SA-2f (Mod 5): FAN SONG F, EW enhanced Backup optical, home-in on jam-capable missile
SA-N-2: Naval test version, unsuccessful
HQ-2: Chinese variant (CSA-1)
Volga-M upgrade: Mid 90's, digital sub- systems, 41 miles range, less maintenance
Iraqi Mod: Infrared terminal guidance/missile

NOTES
The SA-2/Guideline is a two-stage medium-to-high altitude, long-range, radar-tracking SAM. The weapon is a national-level asset usually found in the rear area with the mission of defending static assets such as supply and command installations. It is fired from a single-rail ground-mounted launcher that can be moved by a truck. The missiles are carried on a special transloader-semi-trailer towed by a Zil truck. An SA-2 regiment consists of three battalions, each having a single firing battery. Each battery has six launchers arranged in a star formation, a centrally located FAN SONG fire control radar, and a loading vehicle. The two forward batteries usually locate 40 to 50 km behind front lines; the third battery locates approx 80 km behind.

Limitations include limited effectiveness against updated ECM, restricted mobility, and limited effectiveness against low-altitude targets.

Russian SAM System SA-3/GOA



Weapons & Ammunition Types	Typical Combat Load
Launch rails	**2 or 4**

SYSTEM
Alternative Designations: S-125 Neva, S-125 Pechora (export)
Date of Introduction: Twin launcher 1961/ quadruple launcher 1973.
Proliferation: At least 39 countries

LAUNCHER
Description: Towed twin or quad-rail launcher
Name: INA
Dimensions: INA
Weight (kg): INA
Reaction Time (sec): INA
Time Between Launches (sec): INA
Reload Time (min): 50 (quad launcher)
Fire on Move: No
Emplacement Time (min): 120
Displacement Time (min): 100

ARMAMENT
Missile:
Name: 5V24, 5V27
Range (m):
Max. Range: 29,000
Min. Range: 2,400
Altitude (m):
Max. Altitude: 18,300
Min. Altitude: 4.5
Dimensions:
Length (m): 6.10
Diameter (mm): 550
Weight (kg): 946
Missile Speed (m/s): 650-1,150
Velocity (mach): 3.5
Propulsion: Solid fuel booster
Guidance: Command RF
Warhead Type: Frag-HE
Fuze Type: Proximity RF
Warhead Weight (kg): 73

FIRE CONTROL
Radar:
Name: LOW BLOW
Function: Tracking/Command guidance
Control Range (km): 85
Detection Range (km): 110
Frequency Band: I
Tracking Capability: 1 target simultaneously (1-2 missiles)

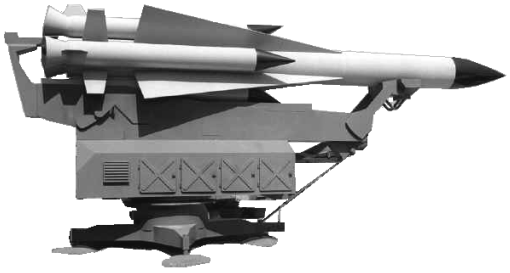
Radar:
Name: FLAT FACE/P-15
Function: Target Acquisition
Detection Range (km): 250
Frequency Band: C

Radar:
Name: SQUAT EYE/P-15M
Function: Target Acquisition (low altitude, instead of FLAT FACE)
Detection Range (km): INA
Frequency Band: C

VARIANTS
SA-3a: Two-rail launcher. Missiles without interstage fins.
SA-3b (GOA Mod 1): Two-rail launcher. Missiles have interstage fins.
SA-3c: Four-rail launcher.
S-125 Pechora: Export version
SA-N-1: Naval version

NOTES
The SA-3/GOA is a two-stage, low- to medium-altitude SAM. Two ready missiles travel in tandem on a modified truck or tracked vehicle from which the crew loads the missiles onto a ground-mounted, trainable launcher for firing. The truck-mounted FLAT FACE radar acquires the targets, while the LOW BLOW radar carries out the fire control function. It is principally a point/small area defense weapon. The SA-3 system is not mobile. It is movable, but its displacement time is considerable.

Russian SAM System SA-5/GAMMON



Weapons & Ammunition Types	Typical Combat Load
Single-rail ground mounted	**Six launchers per Battalion**

SYSTEM
Alternative Designations: S-200, Vega
Date of Introduction: 1963
Proliferation: At least 15 countries

ARMAMENT
Launcher:
Description: Single-rail, ground- mounted, not mobile but transportable
Dimensions: INA
Weight (kg): INA
Reaction Time (sec): INA
Time Between Launches (sec): INA
Reload Time (min): INA
Fire on Move: No
Emplacement Time (min): Days
Displacement Time (min): Days

Missile: (See NOTES)
Name: INA
Range (km):
Max. Slant Range: 300
Effective Range: 250
Min. Range: 17
Altitude (m):
Max. Altitude: 29,000
Effective ceiling: 30,000
Min. Altitude: INA
Dimensions:
Length (m): 10.7
Diameter (mm): 750
Weight (kg): 7,100
Wrap around Boosters:
Length (m): 4.9
Diameter (mm): 500
Missile Speed (m/s): 1,100
Propulsion: 2-stage liquid fuel, four wrap-around solid fuel rockets
Guidance: Semi-active homing
Warhead Type: Conventional (HE) or nuclear
Fuze Type: INA
Warhead Weight (kg): 60 HE
Self-Destruct (sec): INA
Booster separation at (km): 2
Reload Time (min): 5

FIRE CONTROL
Radar:
Name: SQUARE PAIR
Function: Tracking
Effective Range (km): 350
Frequency (GHz): 6.62-6.94
Frequency Band: H
Located: With firing units

Associated Radars:
Name: BACK NET initially BAR LOCK B (P-50) follow-on
Function: Surveillance/ early warning
Range (km): 250/ 390
Frequency Band: E-band (2-2.5 GHz) / E & F bands
Location: Generally with separate early warning or Signals Reconnaissance bns

Name: SIDE NET/PRV-11 initially, ODD PAIR, E-band follow-on
Function: Height Finding Radar
Range: INA
Frequency Band: E-band
Location: Generally with separate early warning or Signals Reconnaissance bns

Name: TALL KING
Function: Very long-range early warning
Effective Range (km): 500-600
Frequency Band: A-band (150-180 MHz)
Location: Generally with separate early warning or Signals Reconnaissance bns

Name: BACK TRAP
Function: Very long-range early earning
Effective Range (km): INA
Frequency Band: A-band (172 MHz)
Location: Brigade Level

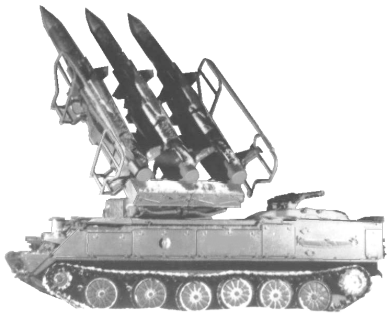
Name: BIG BACK
Function: Very long-range early warning
Effective Range (km): INA
Frequency Band: 3-d L-band
Location: Brigade Level

VARIANTS
Possibly as many as 5 missiles/variants

NOTES
The SA-5/Gammon is a long-range, strategic semi-active guided missile system for targeting medium-to-high altitude high-speed aircraft.

The missile has a long cylindrical body with a conical nose, four long chord cruciform delta wings, four small cruciform rectangular control surfaces at the extreme rear, and four jettisonable, wraparound solid-fuel boosters with canted nozzles. It uses a liquid propellant, dual thrust rocket engine, and the missile travels about 2 km before booster separation. The sustainer has four cropped delta wings and steerable rear fins. Control is assisted by ailerons.

Russian SAM System SA-6/GAINFUL



Weapons & Ammunition Types	Typical Combat Load
Launch rails	**3**

SYSTEM
Alternative Designations: Kub, Kvadral
Date of Introduction: 1966
Proliferation: At least 22 countries

Description:
Crew: 3
Combat Weight (mt): 14
TEL Chassis: Modified PT-76
Length (m): 6.09
Height (m): 4.45
Width (m): 3.04

Automotive Performance:
Engine Name, Type: V-6R, 6 cyl diesel
Cruising Range (km): 250
Speed (km/h):
Max. Road: 45
Max. Swim: N/A

Radio: INA

Protection:
NBC Protection System: Yes

ARMAMENT
Launcher:
Name: 2P25
Reaction Time (min): INA
Time Between Launches (sec): INA
Reload Time (min): 10
Fire on Move: No
Emplacement Time (min): 5 or less
Displacement Time (min): INA

Missile:
Name: 3M9, 9M9
Range (m):
Max. Range: 25,000
Min. Range: 4,000
Altitude (m):
Max. Altitude: 15,000
Min. Altitude: 50
Dimensions:
Length (m): 6.20
Diameter (mm): 335
Weight (kg): 599
Missile Speed: Mach 2.7
Propulsion: Solid fuel
Guidance: Semi-active radar homing
Warhead Type: Frag HE
Fuze Type: Proximity RF
Warhead Weight (kg): 50

FIRE CONTROL
Sights w/Magnification: EO sighting system on vehicle. Commander and driver have IR.

IFF: Pulse-doppler

Radar:
Name: STRAIGHT FLUSH
Function: Fire control /target acquisition
Detection Range (km): 60-90
Tracking Range (km): 28
Frequency: I-low altitude (tracking); G/H-med altitude (acquisition); H (detection)

Radar:
Name: LONG TRACK
Function: Battlefield surveillance/target acquisition
Detection Range (km): 167
Tracking Range (km): 150
Frequency: 2.6 GHz
Frequency Band: E

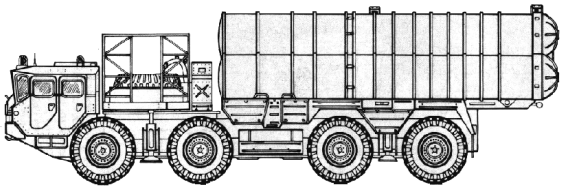
Radar:
Name: THIN SKIN
Function: Height Finding
Detection Range (km): 240
Tracking Range (km): INA
Frequency Band: H

VARIANTS
SA-6b/GAINFUL: Mounted on MT-LB, has integrated radar. The TELAR can operate independently for surveillance.

NOTES
The SA-6 is a two-stage, solid-fuel, low-altitude SAM. It has radio-command guidance with semi-active radar terminal homing. Targets are low to medium altitude fixed- and rotary-wing aircraft. Two or more missiles may be launched at a target during an engagement. The associated STRAIGHT FLUSH fire control/target acquisition radar vehicle uses the same chassis as the SA-6a TEL. The LONG TRACK target acquisition radar is also associated with the SA-6 system. The LONG TRACK surveillance radar acquires target data, the STRAIGHT FLUSH missile site radars take over target acquisition and fire control.

SA-6 regiments organic to mechanized and tank divisions consist of 20 TELs in five batteries, 4 TELs to a battery. The SA-6b system includes the FIRE DOME fire control radar. When the SA-6a TEL battery is replaced with an SA-6b TELAR, the battery doubles its capability to acquire and engage targets. Each battery has four triple launchers, one STRAIGHT FLUSH vehicle, and two reload vehicles (3 missiles each). Normally, three of these batteries are deployed approximately 5 km behind the front line; the remaining two are deployed about 10 km farther back, filling the gaps between the three forward batteries.

Russian SAM System SA-10b/GRUMBLE



Missiles	Typical Combat Load
SA-10b in canisters on-board	**4**

SYSTEM

System Designation: S-300PMU
Alternative Designations: SA-10b GRUMBLE (NATO)
Date of Introduction: 1985
Proliferation: At least 8 countries
Primary Components:
- 1- Launch vehicle with command shelter (5P85SU)
- 2 -Launch vehicles without command shelter (5P58DU)
- 1- FLAP LID B Target engagement radar

ARMAMENT

TEL:
Name: 5P85SU or 5P58DU (see NOTES)
Time Between Launches (sec): 3
Reload Time (min): INA
Crew: 6
Fire on Move: No
Emplacement Time (min): 5
Displacement Time (min): < 5
Missiles Fired Simultaneously: 12 (2 per target)
Targets Tracked Simultaneously: 6

Automotive Performance:
Chassis: MAZ-7910 (8x8)
Engine: D12A-525 V-12 water cooled
Horsepower: 525
Cruising Range (km): 650
Speed (km/h):
- Max. Road: 60

Weight (kg): 20,000
Dimensions (m):
- Length: 9.4
- Width: 3.1
- Height: 3.7

Missile:
Name: 5V55RUD
Range (km):
- Max. Launch Range: 90
- Min. Range: 5

Altitude (m):
- Max. Altitude: 27,000
- Min. Altitude: 25

Speed (m/sec):
- Max Target: 1,200
- Max SAM: 2,100

Dimensions:
- Length (m): 7
- Diameter (mm): 450

Weight (kg):
- In Canister: 2,100

Guidance: Track-Via-Missile (TVM)
Warhead Type: HE
Fuze Type: Contact
Warhead Weight (kg): 133

VARIANTS

SA-10a: Semi-fixed version deployed on trailers.
SA-10c: Improved, longer range (150 km), TOMBSTOME radar, expanded C^2.
HQ-10/HQ-15: Chinese licensed copy of SA-10.
HQ-9/FT2000: Chinese based on S-300PMU (SA-10b).
SA-N-6: Russian naval version.

ASSOCIATED RADARS

Radar:
Name: 30N6
NATO Designation: FLAP LID B
Function: Target Engagement
Unit Associated With: Firing battery
Detection Range (km): 90 km
Interception Altitude (m): 25 and higher
Target Speed (km/h): 4,200
Targets Engaged Simultaneously: 6
Missiles Guided Simultaneously : 12
Frequency (GHz): 10
Frequency Band: I/J

Radar:
Name: 76N6
NATO Designation**:** CLAM SHELL
Function: Low Altitude Search and Acquisition
Unit Associated With: Battalion/regiment
Detection Range (km):
- @ 1,500 feet altitude: 93
- @ 3,000 feet altitude: 120

Targets Tracked Simultaneously: 180 low level targets
Resolution of Target Radar Cross Section (RCS): .02 m^2 @ 1,400 kts
Frequency (GHz): INA
Frequency Band: I

Radar:
Name: INA
NATO Designation: BIG BIRD
Function: Target Detection/Command Guidance
Unit Associated With: Regiment
Frequency (GHz): 3.3
Frequency Band: F

NOTES
The missiles (5V55R) are in a sealed transport launch canister and do not need to be tested or adjusted during their service life of 10 years. They are launched vertically by the canister without turning the launcher toward the target. Each battery has one 5P85SU launcher vehicle with a command shelter mounted behind the cab and one or two 5P58DU launcher vehicles without the command shelter. Two missiles are normally fired at each target increasing probability of hit. The line drawing is of the 5P58DU TEL (without the command shelter).